

REMARKS/ARGUMENTS

Support for the Amendment

The present amendment incorporates the limitations of claim 2 into claim 1, and adds the limitation of the grain size range. Support for the latter is found in the specification as filed at page 4, line 27. Support for new claim 23 is found in the specification at page 23, line 28. No new matter is presented by this amendment.

Claim Rejections - 35 USC § 103

The rejection of the claims over Law et al. in view of Koo et al. is respectfully traversed, particularly in view of the amendment made herein to claim 1, incorporating a limitation on the grain size as well as the limitation originally appearing in claim 2.

Although the Office Action acknowledges the limitation taken from claim 2, Applicants submit that the inference drawn in the Office Action is incorrect and that the phase interfaces of the Law disclosure in general are necessarily populated with carbide precipitates, in direct contradiction to the claim limitation. The method used by Law et al. for achieving the phase structure of the experimental alloys was one involving *isothermal heat treatment*, as stated on page 642, left column, last three lines. Isothermal heat treatment is performed by holding the alloy at a fixed temperature for a period of time prior to the final quenching. As is evident from the "TTT" curve for the alloy (which looks very much like the curves shown in Fig. 1 of Law et al.), the isothermal line crosses phase boundaries and transforms the original phase into a new phase. As the transformation is occurring, the boundary between the two phases forms a slowly moving front through the microstructure and the difference in crystal structures between the two phases causes the ejection of carbides from the original crystalline structure. This results in carbide precipitates forming at the moving front and becoming part of the bulk of the newly formed phase as the front continues to advance and the precipitates remain. The

location of the interface at the final quench will be determined by the length of time that the alloy is held at the transformation temperature. Wherever the interface resides, however, precipitates will be present at the interface since that is precisely the location at which they were formed.

Phase changes without interphase precipitation can indeed be achieved, as explained by Applicants in the specification of the present application, at paragraph 20 bridging pages 6 and 7. The method described in that paragraph is directly opposed to the isothermal method stated by Law et al., and thus the interpretation contained in the Office Action is incorrect: the precipitates that are present within the phases are the direct result of interphase precipitation, and further precipitates exist at the interphase location itself. Thus, despite the fact that Law et al. make no specific mention of carbide precipitates at the interfaces, the precipitates are necessarily there due to the isothermal process by which the phase transformation took place.

A further distinction between the present invention and the disclosure of Law et al. is the grain size. Applicants' claims are limited to a grain size of a maximum of 100 microns while the grain size in Law et al. is quoted as 300 microns. This is a significant difference, too large to be obvious. This type of difference in grain size affects the mechanical properties of the alloy, and the phase distribution of the microstructure. There is no suggestion in Law et al. of the preparation of an alloy with a grain size of less than 100 microns.

The Koo et al. reference has been cited for its disclosure of a low-carbon steel with stated percentages of ferrite, fine-grained lath martensite, and retained austenite. Despite its use of these terms, the microstructure of Koo et al. is not one that contains "laths of martensite alternating with thin films of austenite" as in Applicants' invention. As explained on page 6 of Koo et al., at lines 1-7, the "retained austenite" is located between the martensite phase and a bainite phase, not between laths of martensite. This is an entirely different microstructure, which does not suggest the microstructure claimed by Applicants. "Fine-grained lower bainite" is a critical part of

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PATENT

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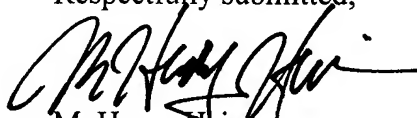
AMENDMENT NO. 2, Reply to Office Action of May 29, 2003

the Koo et al., structure, and the thin films of austenite between the laths of martensite, a critical element of Applicants' microstructure, are entirely missing.

In view of these distinctive features, Applicants submit that the present invention is neither disclosed nor suggested by either of the two cited references, taken either alone or in combination, and reconsideration of the application is respectfully requested.

Should any matters remain that can be resolved by a conference with Applicants' attorney, the examiner is encouraged to telephone the undersigned at 415-576-0200.

Respectfully submitted,



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